

WHAT IS CLAIMED IS:

1 1. A method for modulating a person's autonomic function, the method
2 comprising:

3 interfacing a valve system to the person's airway, the valve system being
4 configured to decrease or prevent respiratory gas flow to the person's lungs during at least a
5 portion of an inhalation event;

6 permitting the person to inhale and exhale through the valve system, wherein
7 during inhalation the valve system functions to produce a vacuum within the thorax to
8 transiently decrease intrathoracic pressure and thereby modulate the person's autonomic
9 function.

1 2. A method as in claim 1, wherein the valve system includes a pressure
2 responsive inflow valve, and further comprising setting an actuating pressure of the valve to
3 be in the range from about -2 cm H₂O to about -30 cm H₂O.

1 3. A method as in claim 2, further comprising setting the actuating
2 pressure of the valve to be in the range from about -3 cm H₂O to about -12 cm H₂O for flow
3 rates between about 30 to about 50 liters per minute.

1 4. A method as in claim 1, wherein during inhalation the valve system
2 functions to decrease the person's heart rate and peripheral vascular tone.

1 5. A method as in claim 1, wherein during inhalation the valve system
2 functions to increase blood flow back to the right heart of the person, thereby enhancing vital
3 organ perfusion and function.

1 6. A method as in claim 1, wherein during inhalation the valve system
2 functions to increase heart rate variability.

1 7. A method as in claim 1, wherein during inhalation the valve system
2 functions to decrease sympathetic tone.

1 8. A method as in claim 1, wherein during inhalation the valve system
2 functions to reduce the person's anxiety level.

1 9. A method as in claim 1, wherein during inhalation the valve system
2 functions to treat shock secondary to hypovolemia, sepsis and heart failure.

1 10. A method as in claim 1, wherein during inhalation the valve system
2 functions to treat sleep disorders, wherein at least one of the sleep disorders comprises apnea.

1 11. A method as in claim 1, wherein during inhalation the valve system
2 functions to treat states of hypo-perfusion that are selected from a group consisting of wound
3 healing, stroke and diseases where blood flow is compromised, wherein at least one of the
4 diseases comprises coronary artery disease.

1 12. A method as in claim 1, wherein during inhalation the valve system
2 functions to improve blood flow to the muscles and brain, thereby reducing heart rate and
3 enhancing recovery from physical exertion.

1 13. A method as in claim 1, wherein the valve system is incorporated into
2 a facial mask or a mouthpiece, and further comprising coupling the facial mask or the
3 mouthpiece to the person's face.

1 14. A method as in claim 2, further comprising coupling at least one
2 physiological sensor to the patient to monitor at least one physiological parameter of the
3 person while breathing through the valve system, and varying the actuating pressure based on
4 the monitored physiological parameter.

1 15. A device for modulating a person's autonomic function, the device
2 comprising:
3 a housing having an opening that is adapted to be interfaced with the person's
4 airway; and
5 a valve system that is operable to regulate respiratory gas flow through the
6 housing and into the person's lungs due to inhalation, the valve system assisting in
7 manipulating intrathoracic pressures during inhalation to produce a vacuum within the thorax
8 to transiently decrease intrathoracic pressure and thereby modulate the person's autonomic
9 function;

10 wherein the valve system is configured to permit respiratory gases to flow to
11 the person's lungs when the negative intrathoracic pressure reaches a pressure in the range

12 from about -2 cm H₂O to about -30 cm H₂O in order to modulate the person's autonomic
13 function.

1 16. A device as in claim 15, wherein the valve system is configured to
2 permit respiratory gases to flow to the person's lungs when the negative intrathoracic pressure
3 reaches a pressure in the range from about -3 cm H₂O to about -12 cm H₂O.

1 17. A device as in claim 15, wherein valve system comprises an inflow
2 valve that is selected from a group of valves consisting of a fish mouth valve, a spring-poppet
3 valve, a ball valve, a flexible plug valve, a slotted airway resistance valve, a movable disk
4 valve, a compressible airway valve, an iris valve and a sequential series of adjusting valves.

1 18. A device as in claim 15, further comprising at least one physiological
2 sensor that is attachable to the patient to monitor at least one physiological parameter of the
3 person while breathing through the valve system.

1 19. A device as in claim 15, further comprising a facial mask coupled to
2 the housing.

1 20. A device as in claim 15, further comprising a mouthpiece coupled to
2 the housing.

1 21. A method for assisting a person in recovering from physical exertion,
2 the method comprising:

3 interfacing a valve system to the person's airway, the valve system being
4 configured to decrease or prevent respiratory gas flow to the person's lungs during at least a
5 portion of an inhalation event;

6 permitting the person to inhale and exhale through the valve system, wherein
7 during inhalation the valve system functions to produce a vacuum within the thorax to
8 improve blood flow to the muscles and brain, and to reduce the person's heart rate.

1 22. A method as in claim 21, wherein the valve system includes a pressure
2 responsive inflow valve, and further comprising setting an actuating pressure of the valve to
3 be in the range from about -2 cm H₂O to about -30 cm H₂O.